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SCLEROTHERAPY OF TESTICULAR HYDROCELES WITH 3% AQUEOUS PHENOL

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With the evolution of minimally invasive approaches in medicine, phenol has regained its popularity for the sclerotherapy of testicular hydroceles. Together with reported efficiency and safety of 2.5% phenol in the literature, the recently proved safety of 3% phenol in esophageal variceal sclerotherapy has led us to perform a prospective study to lessen the number of sessions. Sclerotherapy with 3% aqueous phenol was applied on an ambulatory basis to 23 patients with 31 hydroceles, who were over 40 years old and who had no fertility problems. The over-all cure rate was 96% with an average follow-up of 3 years, and 58% of the hydroceles required only one session of treatment. The average number of treatment sessions was 2.2 (range; 1–7). One patient with a history of herniorraphy 10 years earlier, was treated surgically following failure of seven sclerotherapy sessions.

Phenol, a sclerosant superior to other conventional agents including tetracyclines, requires neither anesthetics nor prophylactic antibiotics. Our findings indicate that sclerotherapy with 3% phenol is an effective, economical and safe form of therapy for patients with hydrocele.

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Key words : Hydrocele, Sclerotherapy, Phenol

INTRODUCTION

Hydrocele is the accumulation of fluid of more than 3–5 ml between the parietal and visceral layers of the tunica vaginalis[1–4] Reportedly, William of Saliceto first used sclerotherapy in the XIIIth. century, and among others, even ginger and sugar were used as sclerosant agents[3]. Since then the effectiveness of sclerotherapy has been debated, and even condemned as an unproven way of treatment[5]. With the evolution of minimally invasive approaches in different medical disciplines, sclerotherapy for hydrocele has again become a matter of clinical research-work to find better sclerosant agents with minimal discomfort and side effects. The currently used sclerosant agents in hydrocele therapy are tetracycline, tetradecyl sulfate, phenol, rolitetracycline, oxytetracycline, polidocanol and ethanol amine oleate[6–17]. With all of these sclerosant agents 25–100% success rates have been reported[1–17]. Recently, phenol has regained its popularity as an effective and safe sclerosant agent in various conditions such as hemorroids, esophageal varices, idiopathic pruritis ani, and pilonidal sinus[18–20] Together with the reported efficiency and safety of 2.5% phenol in literature[1,2,4,5], the recently proved safety of 3% phenol in esophageal variceal sclerotherapy[19] has led us to perform this prospective study to lessen the number of application sessions. This is the first study using 3% aqueous phenol for hydrocele sclerotherapy.

PATIENTS AND METHODS

Twenty-three patients with 31 hydroceles were treated with aspiration and sclerotherapy using 3% aqueous phenol. Prior to application, all of the patients were fully examined including systemic and urological examinations. Patients, more than 40 years old, with no fertility problem, ipsilateral hernia, ipsilateral patent processus vaginalis, acute and chronic infection and previous unsuccessful aspiration with or without sclerotherapy were studied. Thus, only simple hydroceles were chosen with the exclusion of complicated hydroceles, multilocular hydroceles, pyocele, hematocele and tumor suspected cases. A complete blood count, scrotal transillumination, scrotal ultrasound examination, and complete biochemical analyses of serum were done. After being informed, the patients were offered sclerotherapy and consent was obtained.

All patients were treated on an outpatient basis. The lithotomy position was provided, without analgesics, anesthetics and prophylactic antibiotics. Under the guidance of transillumination, the hydrocele sac was punctured with a 14-gauge intravenous catheter, the mandren was removed and the hydrocele fluid was aspirated with a 20 ml syringe gently assisted by manipulation. The volume of the fluid was recorded and specimens of fluid were obtained. Evaluations of glucose, urea, creatinine, electrolytes (Na, K, Ca, Mg, PO4), blood proteins (albumin, globulin), uric acid, lipids, enzymes (ALT, AST, ALP, LDH, Acid phosphatase, PAP, CK-MB) were done. The fluid was examined

cytologically after centrifugation and bacteriologic culture was obtained if the fluid was suspicious in appearance.

After completion of aspiration, previously prepared and autoclaved 3%-phenol solution in distilled water was instilled. The volume of sclerosant instilled was calculated as 1 ml sclerosant per 10 ml fluid volume, with a maximum of 20 ml. The intravenous catheter was removed and the scrotum was gently palpated to ensure distribution of the sclerosant solution. The patients were observed for an hour and the specimens were sent for laboratory examinations. The patients were re-examined at 21 day periods, and if there was any recurrence, instillation was repeated up to seven times. Cure was defined as the absence of fluid accumulation by transillumination examination in the scrotum at least 3 months after the last application.

RESULTS

Table 1 shows the patients profiles The overall cure rate was 95.66% with an average follow-up of 3 years. The number of treatments required were ; 1 injection for 5 hydroceles, 2 injections for 17 hydroceles, 3 injections for 8 hydroceles. One patient (4.34%) with a history of herniorraphy operation 10 years ago was surgically treated after seven unsuccessful sclerotherapy sessions. The average number of injections was 2.22. The mean volume of fluid aspirated was 148 ml. (Range 20 to 500 ml). No scrotal necrosis or sepsis was encountered. Hematocele was developed in only one patient due to the accidental puncture of scrotal veins. Hematocele resolved with general medical treatment. The first rexamination was done 21 days later. In the case of recurrence (decided by positive transillumination), instillation was repeated. Apart from relatively slight pain produced by the introduction of the intravenous catheter, no significant pain was observed. Neither narcotics nor analgesics were required. No prophylactic antibiotics were used. At re-examinations neither scrotal atrophy nor any other damages were observed. Comparative results of biochemical analysis of serum vs hydrocele fluid were as follows ; glucose (60–110 mg/dl) : 88 vs 103, urea (22–46 mg/dl) : 38 vs 34, creatinine (80.0–132 mMol/L) : 88 vs 81, Na (136–145 mMol/L) : 143 vs 151, K (3.5–5.0 mMol/L) : 4.4 vs 4.3, total calcium (2.25–2.75 mMol/L) : 1.92 vs 1.91, PO4 (0.81–1.61 mMol/L) : 2.17 vs 2.16, Mg (0.7–1.0 mMol/L) : 0.7 vs 0.6, uric acid (0.27–0.44 mMol/L) : 0.29 vs 0.31, total protein (63.0–79.0 g/L) : 68.5 vs 29.95, albumin (37.0–53.0 g/L) : 44.29 vs 24.10, globulin (18.01–36.0 g/L) : 24.2 vs 15.7, total lipids (400–900 mg/dl) : 820 vs 89, total cholesterol (140–260 mg/dl) : 224 vs 14, asparatate aminotransferase (AST) (0–25 U/L) : 27 vs 25, alanine aminotransferase (ALT) (0–7 U/L) : 18 vs 15, lactate dehydrogenase (LDH) (60–125 U/L) : 109 vs 97, creatine kinase (CK-MB) (0–16 U/L) : 13 vs 11, glutamyl transferase (GGT) (8–37 U/L) : 13 vs 11, cholin esterase (4,300–10,500 U/L) : 6,189 vs 5,760, alkaline phosphatase (22–87 U/L) : 60 vs 44, acid phosphatase (ACP) (0–4.2 U/L) : 3.2 vs 2.5, prostatic acid phosphatase (PAP) (0–1.2+/L) : 0.8 vs 0.7. As Fig. 1 shows, the hydrocele fluid had a lower protein and lipid concentration than the serum. Interestingly by microscopic examination of the centrifuged fluid, in almost one fifth of the cases sperm cells ranged between 3 to 20 per field (1×400). No bacterial growth was observed in cultures.

Table 1. Patients profiles

	No. of Patients
All cases	23
Age (year)	40–75 (58±10)
History (year)	0.1–40 (8±9)
Fluid volume (ml)	20–500 (180±141)
Phenol volume (ml)	2–20 (13±7)
Number of session	1–7 (2±1)
Laterality	
Right	5
Left	10
Bilateral	8
Etiology	
Occupational minor trauma	11
Orchiepididymitis	5
Inguinal operation	3
Major trauma	3
Post-prostatectomic orchitis	1

Range (mean±SD)

DISCUSSION

The high overall cure rate and low incidence of complications, in our study, is consistent with previous reports using 2.5% phenol[1,2,4,5] Nash[2] reported a 96% success rate with 2.5 phenol, MacFarlane[4] reported a 100% success rate, and followed by a similar success rate of Savion et al.[5] We used 3% phenol and achieved almost the same succuss rate (95%). With tetracyclines, Bodker et al.[7] reported a 90% success rate in only 10 patients, followed by a 96% success rate reported by Rencken et al.[3], Shimamura et al.[30] reported an 83% success rate with minocycline and Yokoo et al.[31], reported a 70% success rate with the same agent. However, Badenoch et al.[9] have reported a 33% success rate in 15 patients. With local anesthetic sclerosant agents other than phenol, such as ethanolamine oleate and polidocanol, the reported success rates range from 37 to 87[15–17]

Together with lower success rates of other sclerosant agents, the high success rates with no

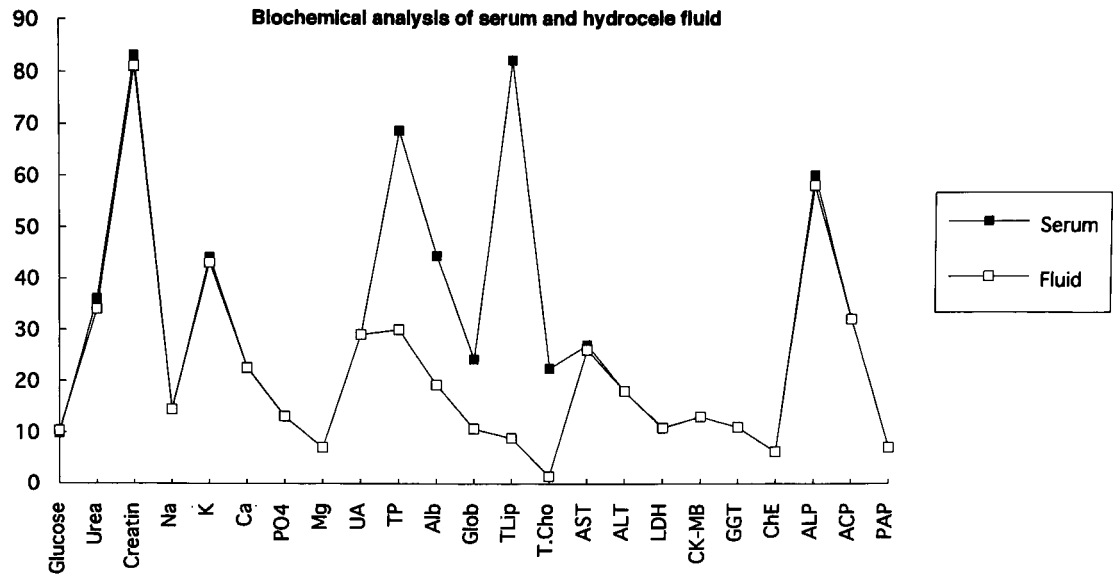

Fig. 1. Comparative results of biochemical analyses of serum and hydrocele fluid in 21 patients (Na : sodium, K : potassium, Ca : calcium, PO_4 : phosphate, Mg : magnesium, UA : uric acid, TP : total protein, Alb : albumin, Glob : globulin, T. Lip : total lipid, T. Cho : total cholesterol, ChE : cholinesterase, ALP : alkaline phosphatase, ACP : acid phosphatase, PAP : prostatic acid phosphatase).

severe pain and few complications of phenol[1,2,4,5] confirm its superiority. Tetracyclines have been rejected because of the severe pain after injection, hematoma and inflammation[32,33], or used[3,4,6,8] after modification by using spermatic cord blockade or addition of local anesthetics to the sclerosant. Nevertheless, the incidence of pain is still a matter of problem with tetracyclines. Pain is also a serious problem with ethanolamine oleate[15] With polidocanol, a higher rate of complications including pain, inflammation and hematoma has been reported by the investigators using this agent[16,17] We have not noted any pain other than pricking of needle during insertion of the cannula. The hematoma was due to accidental tearing of scrotal veins in one of our cases, and resolved with general medical treatment. Neither inflammation, nor serious complications of scrotal necrosis and atrophy were observed in our patients. Difficulty of the comparisons using different sclerosants is obvious, unless randomized trials on the issue are conducted. On the other hand, appropriate patient selection is important. In our study, the number of sessions was higher in patients with inguinal operations than other etiological factors (Table 1).

Since simple aspiration of hydroceles is rarely curative and frequently shows early recurrence[34], surgical repair was suggested as the standard treatment, and widely accepted as the most definitive way of treatment, especially for concomitant and multilocular hydroceles[17]. Among the complications of surgical treatment, hematoma (0–17%) is the most common, and in men desiring future fertility, the primary dangers associated is injury to the epididymis or the vas deferens. Other complications include infection (2–10%) and recurrence (5–10%). Furthermore, the procedure usually requires hospitalization for at least 3 days[34,35]. Moloney[1] demonstrated that the outcome of surgery with the excision of the sac was inferior to that of phenol sclerotherapy in a non-randomized trial. He has recommended surgery as the primary treatment for multilocular hydroceles. Surgery is also the primary treatment for the patients with hydrocele under the age of forty and hydrocele patients with fertility problem since negative effects of sclerotherapy cannot be excluded. Patients who wish future fertility should be excluded from the treatment, because sclerotherapy could potentially compromise the fertility secondary to ischemic epididymitis or fibrosis. In this study, no ischemic epididymitis was encountered. It should be clarified whether or not epididymal or ductal obstruction develops following sclerotherapy with controlled experimental studies. Sclerotherapy is contraindicated in the case of concomitant hydrocele or inguinal hernia, because of the risk of intestinal puncture and intestinal adhesions. Some investigators have suggested that patients under 40 years old be excluded from sclerotherapy because of the residual induration and fibrosis occurring after sclerotherapy which may make differentiation from early testicular malignancies difficult[6,8,9]. Others believe that even younger patients should be treated on the condition that none of the exclusion criteria is present[2,3,34] The etiology of the acute inflammatory reaction due to sclerotherapy is unknown but it is not considered to be of an allergic nature[3] The

sclerosant may leak in to the interstitial space and subsequently cause a chemical injury. In this study, no inflammatory reaction such as induration and fibrosis have been observed. This is probably due to the use of cannula that reportedly minimizes the possibility of trauma to the intrascrotal contents[2]. There were no cases of sepsis after phenol sclerotherapy in this study. Thus, phenol sclerotherapy is a safe and effective therapeutic modality for hydrocele, and phenol is less irritating than other drugs including tetracycline and tetradecyl sulfate. Recently, phenol has been gaining popularity as a sclerosant agent in various diseases other than hydroceles. Five percent aqueous phenol has been used for hemorrhoids with succuss rates of 35–87%, and the cure rate increased by repeated applications in many studies[18,22,23,26–28] Three percent aqueous phenol was also used for endoscopic esophageal variceal sclerotherapy with a success rate of up to 84%, and postmortem histopathological examinations of 15 patients who died following sclerotherapy revealed no esophageal wall necrosis, perforation or mediastinitis[19,20,24,25,29] Furthermore, 5% phenol has been used in the treatment of anal pruritis, with a 92.5% success rate, the remaining patients have also been reported to be cured after a second session of administration[21]

The sclerotherapy has some limitations in the patients with reactive hydrocele due to malignancy, concomitant hydrocele or inguinal hernia and acute and chronic infections of testis and epididymis.

Most of the previous investigators used the volume of the aspirated fluid as a guide to establish the volume of sclerosant to be instilled[2,4,6,15,34]. Our formula was based on two factors ; 1 ml sclerosant per 10 ml fluid evacuated with a maximum of 20 ml. There is no consensus in the literature about the interval between therapy sessions, ranging from 1 month to 6 weeks. Follow-up visits after sclerotherapy varied from one-week to 3 months. Since some reaccumulation of fluid does occur after sclerotherapy, especially within one week, re-evaluation so soon is considered of little value[3,6,34] In this study, the patients were called for re-examination at a 21-day period, and if there was recurrence, application was repeated. Biochemical analysis of serum and hydrocele fluid has been done as shown in Fig. 1. Hydrocele fluid is comparable to the liquid of pleural or peritoneal effusions[36]. The fluid had significantly lower protein and lipid concentrations than the serum. Sperm cells were seen on microscopic examination of the hydrocele fluid after centrifugation. The most probable cause might be the phenomenon called evacuation produced by negative pressure occurring during the forceful suction of hydrocele fluid. A long-standing voluminous hydrocele may lead to testicular atrophy. On the other hand, the presence of the sperm cells inside the hydrocele fluid in some patients might explain another possible immune mechanism causing infertility, which remains unknown.

In conclusion, 3% aqueous phenol sclerotherapy of hydroceles as an outpatient procedure is a highly efficient, safe and cost-effective mode of treatment. Phenol is superior to other sclerosant agents including tetracyclines, since it requires no anesthetics and antibiotics. We expect to obtain a better primary treatment outcome with 5% aqueous phenol and exclusion of the patients with inguinal operations.

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和文抄録

陰嚢水腫に対する3％フェノールによる硬化療法の経験

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現在の医療においては，治療法がより非侵襲性のものへと変遷してきており，その流れのなかで陰嚢水腫をフェノールを用いて治療する硬化療法が見直されてきている．我々は，3％フェノールによる硬化療法を23症例の31陰嚢水腫に試みた．平均3年の経過観察期間において有効率は96％であり，58％の症例においては一回のフェノール療法で治癒できた．また，平均の治療回数は2.2回であった．しかし，10年前にそけいヘルニアの手術既往をもつ1症例においては7回の硬化療法後，外科的処置を要した．フェノールはテトラサイクリン等の硬化剤に比較しても優れた効果を持ち，麻酔や予防的抗生剤の投与を必要としない．われわれの結果は，3％フェノールが陰嚢水腫の硬化療法において効果を有し，経済的にも優れ安全な治療法であることを裏付けるものである．

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